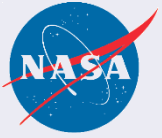


Jet Propulsion Laboratory Strategic University Research Partner



**Robert Shotwell
Jet Propulsion Lab, California Institute of Technology
April 2017**

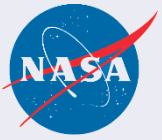


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- **JPL Overview & Strategic Directions**
- **Research Focus Areas**
- **Laboratories & Facilities**
- **Collaboration Opportunities**
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- **Points of Contact**

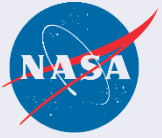


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JPL Overview

- **JPL has a rich history of innovation, technical excellence and curiosity spanning over 60 years**
 - **Starting with the first US satellite**
- **JPL is a Federally Funded Research and Development Center (FFRDC) owned and operated by Caltech**
 - **NASA holds the Prime Contract for JPL, but is not the sole benefactor**
- **JPL employees are employees of Caltech (not government employees)**
- **JPL is a unique environment with a combination of business, commercial and academic cultures**
- **JPL has a very close tie to the Science Communities it serves**
 - **And has a strong internal science element to compliment this**

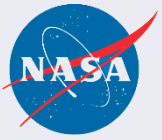


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JPL Quests

- **What changes are happening to our own planet?**
- **How can we help pave the way for human exploration of space?**
- **How did our solar system form and evolve?**
- **Has there ever been life elsewhere in our solar system?
Could it be there today?**
- **Are there planets like Earth elsewhere in the universe?**
- **How did the universe begin, and how is it evolving?**
- **Can we use our unique expertise to serve our nation and its people?**



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Strategic Directions

- **JPL is known for “first of a kind” missions to challenging and new environments**
 - Venus, Mars, Jupiter, Saturn, Interstellar
 - Space Telescopes and Cosmological science
 - Exoplanet detection
 - Leveraging extensive experience in Deep Space activities
 - Leveraging new technology / materials
- **JPL also has an extensive Earth Science program**
 - SRTM, GRACE, TOPEX, SWOT, OCO, SMAP, etc.
- **JPL is currently exploring growth areas in**
 - Next generation space telescopes
 - Direct observations of exoplanets
 - Direct Gravity wave detection, DE and DM missions
 - Europa lander, potentially Titan and other candidate sources of life
 - Micro / mini-satellites in Deep Space applications
 - New robotic explorers (landers, helicopters, inflatables)
 - Support to Human exploration
 - In particular human / robotic interaction and partnering

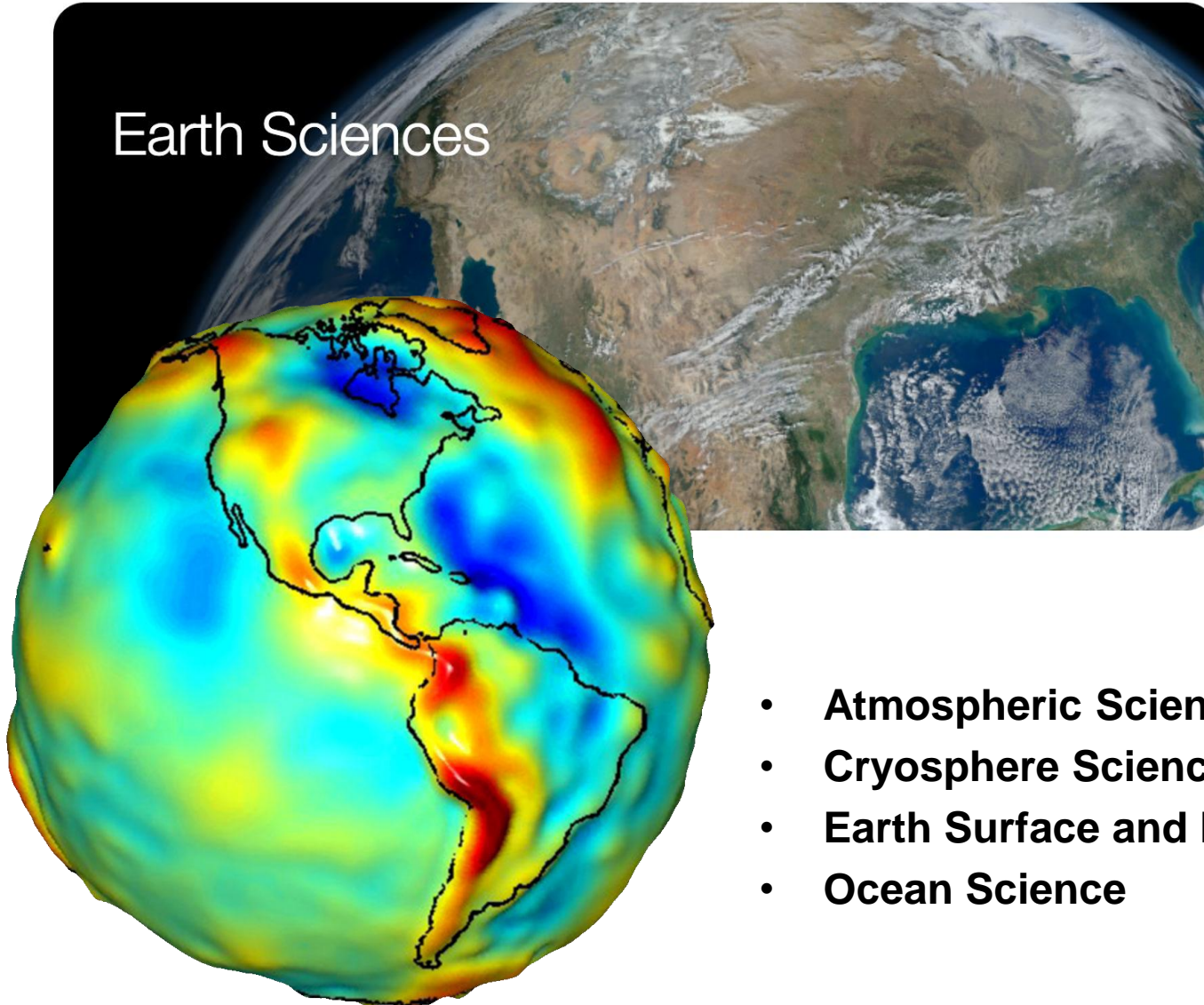


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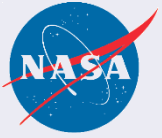
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Earth Sciences

Earth Sciences



- **Atmospheric Science**
- **Cryosphere Science**
- **Earth Surface and Interior Science**
- **Ocean Science**



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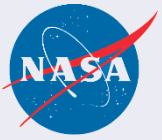
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Astrophysics & Space Sciences

A vibrant, deep-space image showing a dense field of stars and galaxies. The colors are predominantly blue, purple, and pink, with bright white and yellow stars scattered throughout. The background has a textured, nebulous appearance.

Astrophysics & Space Sciences

- **Exoplanet Discovery and Science**
- **Interstellar and Heliospheric Physics**
- **Gravity Waves**
- **Fundamental Physics**
- **Origin of the Universe**
- **Structure of the Universe**



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Spacecraft & Robotics Technologies

Spacecraft & Robotic Technologies



- **Advanced Propulsion and Power**
- **Autonomy**
- **Avionics and Flight Software**
- **Mobility & Robotics**
- **Precision Formation Flying**
- **Survivable Systems for Extreme Environments**



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Communication, Computation & Software

Communications, Computing & Software

- **Deep Space Communication**
- **Deep Space Navigation**
- **Lifecycle Integrated Modeling and Simulation**
- **Mission System Software**



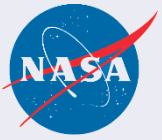
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Instrument Technologies



- **Detectors and Instrument Systems**
- **In-Situ Planetary Exploration Systems**
- **Large Aperture Systems**
- **Spectroscopy**



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Planetary Science



- **Asteroids, Comets, and Small Satellites**
- **Astrobiology**
- **Planetary Atmospheres**
- **Planetary Geology and Geophysics**
- **Radio Science**
- **Solar System Ices and Icy Bodies**



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Labs and Facilities 1

- **Advanced Large Precision Structures (ALPS) Laboratory**
- **Astrobiogeochemistry Laboratory**
- **Astrobiology and Planetary Geochemistry Laboratory**
- **Cryogenic Chemistry Laboratory**
- **Cubesat Development Laboratory**
- **Electric Propulsion Laboratory**
- **Electron Collision Laboratory**
- **Formation Control Testbed (FCT)**
- **Dynamics and Real Time Simulator (DARTS)**
- **Ice Spectroscopy Laboratory (ISL)**
- **Kinetics and Photochemistry Laboratory**
- **Spacecraft Assembly Facilities**
- **Spaceflight Operations Facility (SFOF)**
- **Optical Characterization facilities**
- **Mars Yard**

**Electric Propulsion
Laboratory**





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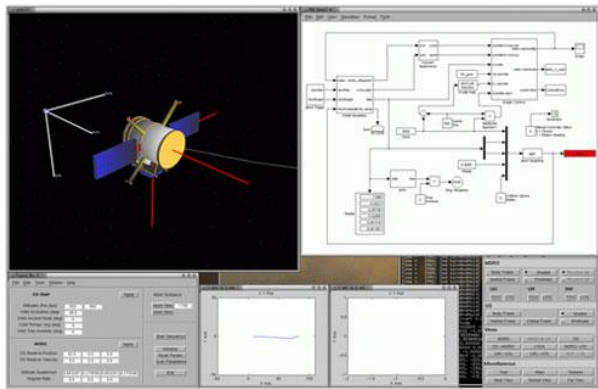
Labs and Facilities 2

- Titan/Exoplanet Organic Aerosol and Surface chemistry (TOAST) Laboratory
- Microdevices Laboratory (MDL)
- MicroPropulsion Laboratory (MPL)
- Metallurgy Facility
- Operations Planning Software Laboratory
- Optical Communications Laboratory / ground terminal
- Planetary Instrument for X-ray Lithochemistry (PIXL) Laboratory
- Quantum Sciences and Technology Laboratories
- Small Satellite Dynamics Testbed (SSDT)
- Stable Isotope Analysis Facility (ISOLAB)

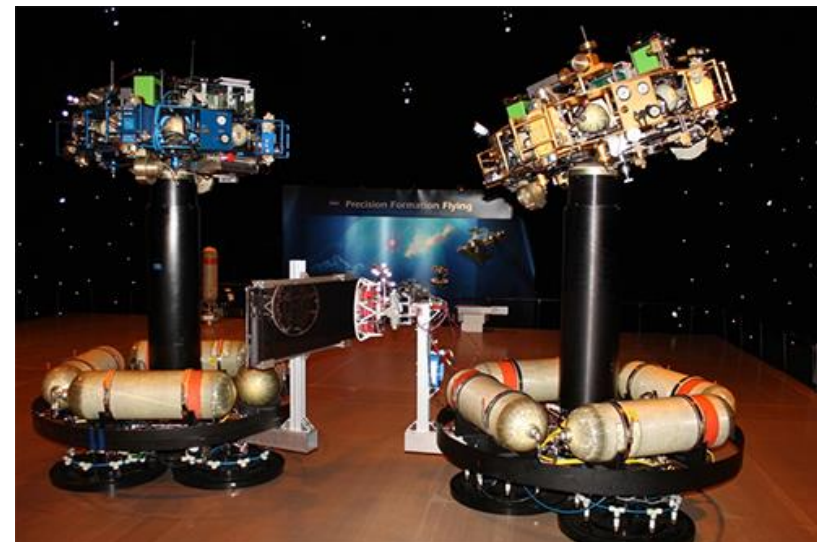


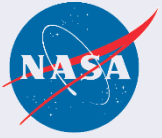
**MDL Electron Beam
Lithography**

**Formation Control
Testbed**



DARTS





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Collaboration Opportunities

- **Faculty Programs**
 - **JPL Summer Faculty Research Program (\$15,000 for 10 weeks, \$2000 travel/housing)**
 - **Center for Academic Partnerships**
 - **Strategic University Research Partner**
 - **NPP Senior Fellows**
- **Student Summer Internship Programs**
 - **10 weeks**



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Funding Opportunities at JPL

Topical Concepts

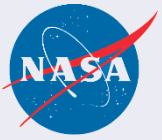
- **\$200K/year for up to 2 years**
- **First PI must be full time JPL employee**
- **1 page proposal (Due: Jan/Feb)**
- **If selected (Notification: April), full proposal (Due: May)**

Innovative Spontaneous Concept

- **Up to \$50K for 120 day duration**
- **First PI must be full time JPL employee**
- **1 page proposal (submit any time, funding dependent)**

Center Innovation Fund

- **\$100K/10 months**



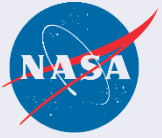
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Funding Opportunities at JPL

Strategic University Research Partnership (SURP)

- **\$100K**
- **Encourage JPL-University collaborations**
 - **Arizona State University**
 - **Carnegie Mellon University**
 - **Cornell University**
 - **Georgia Institute of Technology**
 - **Massachusetts Institute of Technology**
 - **Princeton University**
 - **Stanford University**
 - **University of Texas at Austin**
 - **University of Arizona**
 - **University of California, Los Angeles**
 - **University of Colorado, Boulder**
 - **University of Michigan**
 - **University of Southern California**
- **1 page proposal (Due: Jan)**
- **If selected then submit full proposal requested**



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Points of Contact

- **Should we add some names and emails for a contact person in each area at JPL?**